Mental Toughness

MTQ48

The MTQ48 Handbook

This handbook provides information on the construction, validation and use of the MTQ48. By utilising a folder style system, up-to-date research findings will be added regularly to provide valuable information on the MTQ48.

Note: A list of the references used in this handbook can be provided on request.

Mental Toughness

The MTQ48 provides a reliable and quick assessment of an individual's ability to withstand pressure in a range of workplace environments. It measures mental toughness in terms of 4 core components – control, challenge, commitment and confidence.

What is Mental Toughness?

Mental Toughness is:

The ability to "perform under pressure"

Tim Henman

(in *Coaching Excellence*, 1996)

"having complete control over your emotions . . . and controlling all situations you can control"

Greg Rusedki

(in *Coaching Excellence*, 1996)

"The mentally tough individual has a high sense of self-belief and an unshakeable faith that they control their own destiny. Furthermore, they remain relatively unaffected by competition or adversity."

Peter Clough

Mental Toughness refers to an individual's resilience and an inner drive to succeed - particularly when the going is challenging. It explains why it is possible to place two individuals into the same working environment and to see that one finds it difficult to cope with pressure and one thrives.

The **mentally tough** person tends to be:

• Sociable and outgoing;

• Being able to remain calm and relaxed, they are competitive in many situations and have lower anxiety levels than others.

• With a high sense of self-belief and an unshakeable faith that they control their own destiny, these individuals can remain relatively unaffected by competition or adversity.

The **key issues** around Mental Toughness that individuals and organisations need to understand are:

• What causes one person to succumb and another to thrive?

• Can we identify people's strengths and weaknesses in these areas?

• Can we "toughen up" individuals to enable them to handle stressors more effectively?

• How can we support individuals better with their specific needs?

Core Components of Mental Toughness

Research in the Psychology Department, at the University of Hull, under the direction of Dr. Peter Clough identified 4 key components of Mental Toughness:

- **Control**
- **Challenge**
- **Commitment**
- **Confidence**

▪ Control

Individuals who score high on this scale feel that they are in control of their work and of the environment in which they work. They are capable of exerting more influence on their working environment and are more confident about working in complex or multi-tasked situations. This means for example that, at one end of the scale individuals are able to handle lots of things at the same time. At the other end they may only be comfortable handling one thing at a time. Ongoing development of MTQ48 has enabled the identification of 2 subscales to this scale:

Control (Emotion) - Individuals scoring highly on this scale are better able to control their emotions. They are able to keep anxieties in check and are less likely to reveal their emotional state to other people.

Control (Life) - Individuals scoring higher on this scale are more likely to believe that they control their lives. They feel that their plans will not be thwarted and that they can make a difference.

▪ Challenge (Sometimes Called Change Orientation)

Describes the extent to which individuals see challenges as opportunities. Individuals who see them as opportunities will actively seek them out and will identify problems as ways for self-development. At the other end challenges are perceived as problems and threats. So, for example, at one end of the scale we find those who thrive in continually changing environments. At the other end we find those who prefer to minimise their exposure to change and the problems that come with that - and will strongly prefer to work in stable environments.

Commitment

Sometimes described as "stickability", this describes the ability for an individual to carry out tasks successfully despite any problems or obstacles that arise whilst achieving the goal. Consequently an individual who scores at the high end of the scale will be able to handle and achieve things to tough unyielding deadlines. Whereas an individual at the other end will need to be free from those kind of demands to achieve their goals.

Confidence

Individuals who are high in confidence have the self-belief to successfully complete tasks, which may be considered too difficult by individuals with similar abilities but with lower confidence. Less confident individuals are also likely to be less persistent and may make more errors. For example, individuals at one end of the scale will be able to take setbacks (externally and self generated) in their stride. They keep their heads when things go wrong and it may even strengthen their resolve to do something. At the other end individuals will be unsettled by setbacks and will feel undermined by these. Their heads are said to "drop".

Confidence (Abilities) - Individuals scoring highly on this scale are more likely to believe that they are a truly worthwhile person. They are less dependent on external validation and tend to be more optimistic about life in general.

Confidence (Interpersonal) - Individuals scoring highly on this scale tend to be more assertive. They are less likely to be intimidated in social settings and are more likely to push themselves forward in groups. They are also better able to cope with difficult or awkward people.

The Mental Toughness Team

- **Dr Peter Clough** BSc (Hons), MA, PhD, Chartered Psychologist, BASES, Accredited Sports Psychologist

The University of Hull, Department of Psychology

Dr Peter Clough is the Head of Psychology at the University of Hull. A major area of interest (and one where he is now an acknowledged authority) is **Mental Toughness**. A good example of Peter's ability to cross over research, this has its roots in his interest in Sports psychology. Oft quoted but little understood, Peter has operationalised this concept and developed an approach where individual and teams can learn to deal more effectively with the stressors and challenges in the workplace. His Mental Toughness work make a significant contribution to our understanding of how to develop performance in the workplace. In the course of that work he developed the unique Mental Toughness Measure – MTQ48 - and a validated Mental Toughness Development Programme.

- **Dr David Marchant** BSc (Hons), MSc, PhD, Chartered Psychologist

The University of Hull, Department of Psychology

- **Keith Earle** BSc (Hons)

The University of Hull, Department of Sport, Health and Exercise Sciences

Development Sample

To evaluate the proposed factor structure, a development sample was tested. Nine hundred and sixty three questionnaires were completed. The sample consisted of following; Students 619, Administrators/Managers 136, Engineers 42 and Athletes 166. It consisted of 338 males (35.1%) males and 376 (39%) females and 249 (25.9%) did not state their gender. The age range of the sample was 18 to 59 (mean = 24.21; sd = 5.23).

As with the first development sample, the data were coded, entered into SPSS and subjected to data reduction. Principal components analysis with varimax rotation was used and eigenvalues greater than one were accepted. Six factors had eigenvalues greater than one, which together accounted for 62.7% of the variance. Only factor loadings above .3 were acknowledged.

Analysis of the six factor solution

The first factor, **Challenge**, accounted for 15.1% of the variance. Only eight of the challenge items loaded strongly onto this factor (factor loadings ranged from .339 to .625). In addition to the eight challenge items, one commitment item also loaded on this factor; "I don't usually give up under pressure". However, this factor possessed a higher loading on the commitment factor. Three further items did not reach the cut-off level of .3 and therefore were removed from further analysis.

The second factor, **Life Control**, accounted for 13.5% of the variance. Only seven of the Life Control items loaded onto this factor (factor loadings ranged from .412 to .609. As with the previous factor, one further item; "I often wish my life was more predictable" was also loaded on the on this factor, but as before it was more heavily loaded on the challenge factor. Surprisingly, four items failed to load onto the Life Control factor above the cut-off level of .3 and therefore were removed from further analysis.

All 11 items loaded onto the third factor of Commitment (accounting for 11.3% of the variance). In addition to the 11 commitment items (factor loadings ranging from .316 to .692) one of the Emotion Control items ("When I am feeling tired I find it difficult to get going")

loaded onto commitment, although this item was found to also load onto its target factor. Therefore, these items were retained to represent their original factor.

The **Confidence in Abilities** factor accounted for 9.3% of the variance. The allowable factor loadings ranged from .397 to .606 however, two items did not reach the .3 cut-off level and therefore were removed.

The **Emotional Control** factor accounted for 7.4% of the variance. Unfortunately four of items did not reach the .3 cut-off level. The remaining seven items had factor loading ranging from .376 to .702.

The final factor of **Interpersonal Confidence** accounted for 6.1% of the variance. Only six of the items loaded strongly onto this factor (factor loadings ranged from .432 to .690). However, there were another two items which also loaded on this factor; "When I am upset or annoyed I usually let others know" and "I generally hide my emotion from others". Both these items factored more highly on this factor than their target factor but it was decided not to incorporate them into the interpersonal confidence factor due to the fact that the items can clearly be seen as having aspects of emotional control and interpersonal confidence, but the items on face validity were clearly items relating more to emotional control.

Therefore the Mental Toughness Questionnaire comprised of 48 items, Challenge (8 items), Commitment (11 items), Emotional Control (7 items), Life Control (7 items), Confidence in Abilities (9 items) and Interpersonal Confidence (6 items).

MTQ48 Reliability

Scale Reliability of the Mental Toughness Questionnaire 48 (MTQ48)

The MTQ48 has an overall test-retest coefficient of .90, with the internal consistency of the subscales presented in the table below.

MTQ48 Sub Scales	No. of Items	Cronbach's alpha
Challenge	**8**	**.71**
Commitment	**11**	**.80**
Control	**14**	**.74**
Emotional Control	**7**	**.70**
Life Control	**7**	**.72**
Confidence	**15**	**.81**
Confidence in Abilities	**9**	**.75**
Interpersonal Confidence	**6**	**.76**
Whole scale	**48**	**.91**

All subscales reached the minimum acceptable level (0.70) recommended by Kline (Kline, 1999) when investigating the reliability of psychological constructs. This supports the homogeneity of each subscale and the MTQ48 as a whole.

Construct Validation of the Mental Toughness Questionnaire 48 (MTQ48)

To investigate the convergent validity of the MTQ48, Pearson's correlations were calculated for the Total scores for MTQ48 and the eight sub-scales of the PREVUE personality scale. A sample of 205 within the development sample completed both the MTQ48 and the PREVUE personality scale.

Prevue Scale Description	Correlation with MTQ48
Co-operative - Competitive	.203
Submissive - Assertive	.382**
Innovative - Conventional	.074
Reactive - Organised	-.050
Self-sufficient - Group Oriented	.242*
Reserved - Outgoing	.387**
Restless - Poised	.377**
Excitable - Relaxed	.478**

* - significant at the .05 level
** - significant at the .01 level

As expected there were a number of significant and predicted relationships. The aspects where these relationships were most strongly highlighted were first, in the PREVUE scale dimension of "Excitable-Relaxed" where a correlation of .478 was found. This coupled with the significant correlation (.377) on the "Restless-Poised" scale highlights an important aspect of mental toughness, that being the ability to control anxiety and nervous tension. The other significant correlations centre on the concepts of confidence and the ability to work with others ("Submissive - Assertive and Self-sufficient - Group Oriented). The three remaining non-relating sub-scales were "Co-operative - Competitive", "Reactive-Organised" and "Innovative - Conventional", it can be logically concluded that an approximately equivalent measure of each of these dimensions is required in order to function effective as an individual, therefore it was no surprise to see these sub-scale snot significant correlate with mental toughness.

Mental Toughness: Gender Differences

With a sample of 28 males and 25 females (mean age 24.51, SD 4.82), in support of the MTQ48 as a viable testing method no statistically significant difference was observed between male and female participants for any MTQ 48 Subscale, thus preventing bias between genders. See table.

	Male			Female		
Measure	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**
Mental Toughness	28	3.58	0.31	25	3.51	0.32
Challenge	28	3.77	0.45	25	3.78	0.51
Commitment	28	3.66	0.46	25	3.52	0.39
Emotional Control	28	3.46	0.34	25	3.41	0.39
Life Control	28	3.28	0.49	25	3.32	0.36
Ability Confidence	28	3.52	0.43	25	3.44	0.35
Interpersonal Confidence	28	3.74	0.53	25	3.60	0.74

Mental Toughness: Differences between Police Recruits and First Year University Students

Using a sample of 30 Police Recruits (mean age, 30.37, SD 8.75) and 23 Students (mean age 18.65, SD 0.88), differences in the subscales of the MTQ48 were investigated. See table.

Measure	Police		Students	
	Mean	Standard deviation	Mean	Standard deviation
Mental Toughness 1	3.62	.33	3.45	.27
Challenge 1	3.84	.41	3.68	.55
Commitment 1	3.71	.44	3.44	.38
Emotional Control 1	3.48	.37	3.39	.37
Life Control 1	3.32	.51	3.27	.30
Ability Confidence 1	3.57	.39	3.37	.38
Interpersonal Confidence 1	3.76	.60	3.57	.68

Police recruits measured significantly higher (p=.05) **total mental toughness**; the magnitude of the differences between the means was substantial (eta squared =.44).

The police recruits did not differ significantly from the student cohort in scores for the C**hallenge** sub-scale pre (eta squared =.21).

For C**ommitment,** the difference between groups is significant (p=.02) and is supported by the effect size between each group (eta squared=.52).

The scores presented for **Emotional Control** indicate that the relationship between the two groups is not significant.

The **Life Control** sub-scale shows no significant relationship exists between the two populations.

Confidence in Abilities scores suggest there to be no significant relationship between groups.

For **Interpersonal Confidence** analysis did not indicate any strength of potential significance of relationship between groups (t=1.11).

MTQ48 and Other Scales

The MTQ48 has been shown to correlate significantly with the following well documented scales and measures.

	Pearson's Correlation	Scale
Optimism	0.48	Life Orientation Test
Life Satisfaction	0.56	Satisfaction with Life Scale
Self-Image	0.42	Self-Esteem Scale
Self-Efficacy	0.68	Self Efficacy Scales
Trait Anxiety	0.57	State-Trait Anxiety Questionnaire

Summary

Individuals scoring higher in Mental Toughness on the MTQ48 also scored significantly higher in Optimism, Life Satisfaction, Positive Self-Image, Self-Efficacy, and lower Trait Anxiety.

Mental Toughness Case Studies

- Mental Toughness: Bouncing Back
- Mental Toughness and Health
- Mental Toughness: Influence on Vigilance and Stress Resistance
- Mental Toughness in a Development and Assessment Centre
- Mental Toughness and The Prevue Assessment Battery
- Mental Toughness and Reaction to Test Environments: Appraisal and Physiological Response
- Mental Toughness and Reaction to Test Environments: Appraisal and Physiological Response
- Mental Toughness and Shift Work: Implications for Job Satisfaction and Psychological Health
- SHORT CASE STUDY: Mental Toughness and Tolerance of Physical Discomfort
- SHORT CASE STUDY: Rugby Players' Mental Toughness: Comparing Ability Level and Coach Assessment
- SHORT CASE STUDY: Mental Toughness and Perceptions of Physical Effort
- Mental Toughness and Rehabilitation from Sport Injury
- Mental Toughness and Police Stop and Search Behaviour
- SHORT CASE STUDY: Mental Toughness and Health 2
- Mental toughness and managerial position.
- Mental Toughness and Delinquency
- SHORT CASE STUDY: Mental Toughness study on an Outbound Call Centre based in the North West of England

Mental Toughness: Bouncing Back

The criterion related validity of the MTQ48 was investigated by a study which examined the moderating effects that mental toughness has on performance. The study explored the ability for individuals to "bounce back" or show resilience when faced with severe adversity.

The study consisted of 79 participants (42 males, M age = 22.74 years, SD =3.43, 37 females, M age = 22.43, SD = 3.85) who were given either positive or negative feedback after completing a number of motor tasks. They then carried out a cognitive task (planning exercise) as an objective measure of performance.

Feedback Tasks

Task 1 - The shooting task entailed shooting a "laser" gun at targets. The task was initially and successfully demonstrated by the experimenter. For each of the 30 trials, the experimenter switched on the appropriate light bulb for the target and the participants were asked to shoot. Dependent on the feedback categories the participants either scored 20% less than estimated (negative feedback group) or one higher than estimated (positive feedback group). The success rate was manipulated by the experimenter. When all 30 trails have been completed the participants were fed back their "actual" results.

Task 2 - Immediately after the first task the participants were asked to complete a snooker shot task. After rating rate their snooker ability on a 1 -10 scale, participants were asked to complete five practice shots. Participants were then directed to carry out five pre-set shots and each shot was rated as to its success. At the end of this task the participants were given either negative or positive feedback in accordance with their allocated group.

Planning Task

Straight after the snooker task the participants undertook a planning exercise. The exercise required various details and information to be organised into a timetable of sessions for a series of training classes. The main subtasks involved arranging appropriate dates for trainers, candidates and availability to hold the training sessions. More than one answer could be found for each subtask to fit in the appropriate slots on the timetable. However, only one totally correct answer could be found in which all details would fit into the timetable. Participants were provided with all subtask information at the beginning of the exercise and were able to

work through the information in any order they chose. All participants were given 30 minutes to complete the exercise.

Population Scores of Mental Toughness

	N	Minimum	Maximum	Mean	Std. Deviation
Challenge	79	2.50	4.75	3.75	.44
Commitment	79	2.00	4.36	3.47	.44
Control	79	2.36	4.07	3.30	.38
Confidence	79	2.27	4.60	3.47	.47
Mental Toughness	79	2.48	4.17	3.46	.34

Performance Scores on Planning Exercise for Participants Receiving Positive and Negative Feedback

		Negative Feedback		Positive Feedback	
Mental Toughness Group	N	Mean	Std. Deviation	Mean	Std. Deviation
Low	9	1.56	.882	2.42	.90
High	12	2.25	1.055	3.33	.87

The extreme scores of mental toughness (high and low 25%) were examined and they showed that the participants with high mental toughness scored significantly higher on the planning exercise than the low mental toughness group (M=2.71, SD=1.10, M=2.05, SD=.97; t=2.08, df40, p=.044).

The group that were given negative feedback scored significant lower than the group that received positive feedback (M=2.86, SD=.96, M=2.29, SD=1.14; t=2.02, df77, p=.047).

The results that supports the MTQ48 as a valid instrument is the result of the interaction of feedback and level of mental toughness on performance. The results showed that the performance level of high mental toughness participants was not adversely affect by negative feedback, whereas the participants with low mental toughness performed significantly worse when negative feedback was administered (F=4.36, df1, p<.05).

Mental Toughness and Health

This study compared a range of psychological variables and the MTQ48. The design of the experiment allowed for the direct correlation of the MTQ48 and component parts against a number of other questionnaires: the **State Fatigue Inventory** (Earle, 2004); the **Hospital Anxiety Depression Scale** (Zigmond & Snaith, 1983), and the **General Fatigue Questionnaire** (Earle, 2004).

The **State Fatigue Inventory (SFI)** has five factors: *mental fatigue; physical fatigue; sleep fatigue; negative affect; and boredom*. Scores are in the range of 18-90 - with higher values indicating greater fatigue. The **General Tiredness Questionnaire (GTQ)** has six trait factors of fatigue: *Physical Fatigue; Mental Fatigue; General Fatigue; Morning Tiredness; Evening Tiredness; and Mental Strategies*. It has 24 items, scores range between 24-120, with higher scores denoting greater general tiredness. The **Hospital Anxiety and Depression Scale** (**HADS**) is a 14-item scale measuring both *anxiety* and *depression*, participants selecting one of four statements that most closely resembles their individual choice of answer. Both anxiety and depression - 7 questions each - are scored from 0-21. Scores below eight considered perfectly normal, those from 8-10 can be considered borderline and higher scores indicate possible dysfunction.

The SFI was given to participants after a short battery of demanding mental tasks, whereas, the **HADS** and **GTQ** were administered prior to undergoing the demanding mental tasks. The period of demanding mental tasks lasted 1 hour and included a sustained attention task (vigilance), and various decision making tasks performed continuously without rest. This technique was been found to significantly fatigue individuals.

Results

				General Tiredness Questionnaire				
MTQ48	**State Fatigue**	**HADS Anxiety**	**HADS Depression**	**General Fatigue**	**Morning Fatigue**	**Evening Fatigue**	**Mental Fatigue**	**Total**
MTQ Total	-.321*	-.569**	-.594**	-.568**	-.558**	-.249	-.545**	-.595**
Challenge	-.399*	-.410**	-.471**	-.402*	-.433*	-.226	-.358*	-.498**
Commitment	-.149	-.287	-.243	-.259	.131	-.065	-.365*	-.196
Control over Emotions	-.241	-.447**	-.196	-.336*	-.510**	-.234	-.409**	-.409**
Control of Life	-.089	-.566**	-.746**	-.383*	-.591**	-.042	-.376*	-.463**
Confidence: in abilities	-.306	-.529**	-.546**	-.629**	-.565**	-.124	-.399*	-.501**
Confidence: interpersonal skills	-.104	-.079	-.248	.279	-.058	-.319*	-.298	-.276

Summary of Findings

Individuals scoring higher on **Total Mental Toughness** were significantly more likely to score lower on **State Fatigue** after the mental task, and lower levels of **Anxiety** and **Depression**.

Individuals scoring higher on **Mental Toughness: Challenge** were significantly more likely to score lower on **State Fatigue** after the mental task, and lower levels of **Anxiety** and **Depression**.

Individuals scoring higher on **Mental Toughness: Control of Emotions** were significantly more likely to score lower in **Anxiety**.

Individuals scoring higher on **Mental Toughness: Control of Life** were significantly more likely to score lower in **Anxiety and Depression**.

Individuals scoring higher on **Total Mental Toughness** were significantly more likely to score lower on **General Fatigue, Morning Fatigue, Mental Fatigue and Total Fatigue**.

Individuals scoring higher on **Mental Toughness: Challenge** were significantly more likely to score lower on **General Fatigue, Morning Fatigue, Mental Fatigue and Total Fatigue**.

Individuals scoring higher on **Mental Toughness: Commitment** were significantly more likely to score lower on **Mental Fatigue**.

Individuals scoring higher on **Mental Toughness: Control of Emotions** were significantly more likely to score lower on **General Fatigue, Morning Fatigue, Mental Fatigue and Total Fatigue**.

Individuals scoring higher on **Mental Toughness: Control of Life** were significantly more likely to score lower on **General Fatigue, Morning Fatigue, Mental Fatigue and Total Fatigue**.

Individuals scoring higher on **Mental Toughness: Confidence in Abilities** were significantly more likely to score lower on **General Fatigue, Morning Fatigue, Mental Fatigue and Total Fatigue**.

Individuals scoring higher on **Mental Toughness: in Interpersonal Skills** were significantly more likely to score lower on **Evening Fatigue**.

In conclusion, the MTQ48 promotes moderate correlations with anxiety, depression and both state and trait fatigue. In addition, these correlations are entirely negative, indicating that higher mental toughness - both entirely and aspects of - is indicative of reduced anxiety, lower depression scores, and less fatigue in a number of specific situations.

Mental Toughness: Influence on Vigilance and Stress Resistance

The concept of mental toughness is becoming increasingly prominent as a significant determinant of performance under evaluative or stressful conditions. One area of performance required in a number of occupations is sustained attention or vigilance, which involves maintaining focus and awareness for extended periods of time. Nakamura (2001) reported that high mentally tough individuals have higher levels of concentration (of which vigilance is a major dimension) than low mentally tough individuals. This study sought investigate the relationship between mental toughness (as measured using the MTQ48) and vigilance as a measure of performance under mental stress.

Method

Twenty Two healthy participants (8 males and 14 females) took part in this study, with a mean age of 21 years. Participants were grouped as either high or low mentally tough in relation to their MTQ48 scores.

Participants carried out a vigilance task under both normal and stressed conditions. The vigilance task consisted of watching a computer screen on which a circle of 20 points would progressively illuminate one-by one, similar to the second hand advancing round a clock face. Participants watched for a 'missed' advancement, where the point supposed to illuminate does not, and the next one does. When this event occurred, participants were to respond as quickly as possible. The task lasted 10 minutes, during which each point was highlighted for 0.7 seconds and 40 'misses' would occur. The number of errors (missed responses and incorrect responses) was calculated for comparison.

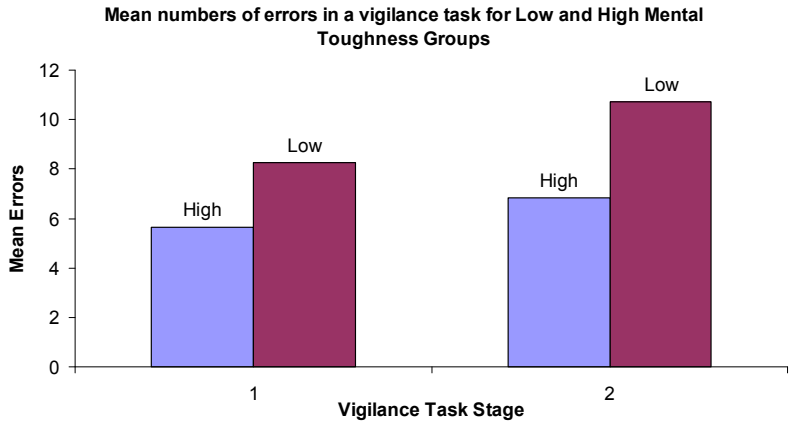
Following completion of the first experimental ten-minute stage, participants were asked to place their hand into the cold water bath, keeping it open, for three minutes, but were informed that they were free to withdraw their hand at any time if it became too uncomfortable. The second stage of the Mackworth Clock task was identical to the first stage, and was completed immediately after the end of the cold pressor test.

Heart rate variability (HRV) was taken as a measure of physiological response, with lower levels of HRV indicating higher levels of stress response.

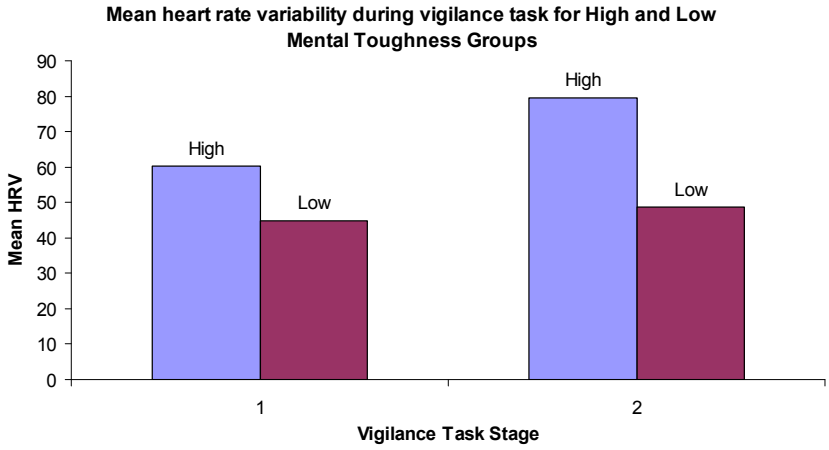
Results

High mentally tough individuals performed significantly better on the Mackworth Clock task, reporting higher levels of vigilance then lower mentally tough individuals. This was apparent in the significantly lower number of errors for high mental toughness participants for normal stage 1 (mean

number of errors 5.64, SD 1.57) and stressed stage 2 (mean number of errors 6.82, SD 2.96) when compared to low mental toughness participants for stage 1 (mean number of errors 8.27, SD 2.94) and stage 2 (mean number of errors 10.73, SD 4.34). ANOVA results of ($F(1,20) = 6.92$, $p<0.05$) and ($F(1,20) = 13.55$, $p<0.01$) respectively. See graph.



High mental tough participants also presented significantly greater heart rate variability during both normal (60.28, SD 22.33) and unstressed conditions (79.49, SD 29.68),when compared to low mental toughness participants (44.72, SD 8.81 and 48.54, SD 10.01). This finding also reached significance ($F(1,20) = 10.75$, $p<0.01$), indicating a main effect of mental toughness on heart rate variability during mental stress. See graph.



Summary of Findings

1. The MTQ48 successfully predicted performance on a standard test of vigilance. High mentally tough individuals were more vigilant under both normal and stressful conditions.
2. High mentally tough individuals demonstrated superior physiological responses to physically stressful conditions.
3. Mentally tough individuals were better able to cope with stress.

Mental Toughness in a Development and Assessment Centre

Participants

Participants in this study were all managers attending an assessment and development centre. In total, 126 participants were involved in the study, of these 48 were male and 78 female.

A wide range of age groups were represented in the sample as follows

	< 20	21-25	26-31	31-35	36-40	41-45	46-50	51-55	56-60
n	3	8	7	21	20	33	19	8	2

Total – 121 (5 declined to answer this question)

Tasks and Activities

A number of tasks and activities were designed in order to assess the performance of the development centre participants. These tasks are briefly described below:

Team Video Exercise (Group): Groups discuss a given hypothetical scenario and are to devise a storyboard for an entertaining and informative 10 minute film. Although groups are not expected to make the video, the ideas discussed have to be presented in a format that would allow a professional film maker to understand what was required.

Presentation (Individual): Individuals prepare a 7 minute presentation that will be given to the rest of the group on a project they would want to setup. Presentations would be marked on how the idea was sold to the audience. Presenters also faced an 8 minute question and answer session.

Written Critique (Individual): Participants complete a written critical review of one of the individual presentations (see above) and the ideas presented. Participants have 25 minutes to complete the exercise, and the critique should be written with the assumption that the presenter will read the report.

Planning Exercise (Individual): This exercise involves participants planning and timetabling a series of two day training events. Individuals are given 30 minutes to complete the exercise and have to submit a written piece of work in order to successfully complete the task.

Team Presentation Decision (Group): In groups, participants have to review the earlier presentations and reach a consensus as to which of the ideas presented should be supported by the group as the most effective proposal. Reasons for why this is the case should also be prepared along with an agreement as to how the presentation could have been improved.

Results

Mental Toughness Dimension	Team Video	Presentation	Written Critique	Planning	Team Presentation Decision
Total	0.189*	0.113	0.132	0.001	0.188*
Challenge	0.304	0.129	0.015	0.140	0.210*
Commitment	0.109	0.003	0.079	0.032	0.167
Control	0.099	0.068	0.036	-0.019	-0.020
Life Control	0.257**	0.076	0.012	0.036	0.046
Emotional Control	-0.080	0.067	0.044	-0.200*	0.027
Confidence	0.099	0.062	0.180*	0.039	0.243**
Confidence: in Ability	0.042	0.053	0.133	-0.048	0.101
Confidence: Interpersonal	0.215*	0.085	0.106	0.016	0.290**

* Correlation is significant at the 0.01 level (2-tailed).

** Correlation is significant at the 0.05 level (2-tailed).

Summary of Findings

Individuals scoring higher on **Total Mental Toughness** were significantly more likely to perform better in the **Team Video Exercise**.

Individuals scoring higher on **Total Mental Toughness** were significantly more likely to perform better in the **Team Presentation Exercise**.

Individuals scoring higher on **Mental Toughness: Challenge** were significantly more likely to perform better in the **Team Video Exercise**.

Individuals scoring higher on **Mental Toughness: Life Control** were significantly more likely to perform better in the **Team Video Exercise**.

Individuals scoring higher on **Mental Toughness: Emotional Control** were significantly more likely to perform better in the **Planning Exercise**.

Individuals scoring higher on **Mental Toughness: Confidence** were significantly more likely to perform better in the **Written Critique Exercise**.

Individuals scoring higher on **Mental Toughness: Interpersonal Confidence** were significantly more likely to perform better in the **Team Video Exercise**.

Individuals scoring higher on **Mental Toughness: Interpersonal Confidence** were significantly more likely to perform better in the **Team Presentation Exercise**.

Mental Toughness and The Prevue Assessment Battery

This study sought to investigate the relationships between the subscales of the MYQ48 and the components of the Prevue Assessment Battery.

The Prevue ICES Plus Assessment Battery

The ICES Plus battery is designed to provide a reliable means or assessing Interest, Ability and Personality. It includes:

- **An Ability scale (ICES Plus Ability)** represented by a set of three ability tests designed to assess numerical, verbal and spatial ability.
- **An inventory of interests (ICES Plus Interest Inventory)** which assesses occupational interest in relation to working with People, Data and Things.
- **A Personality Assessment Instrument (ICES)** which covers four major personality dimensions (Independence, conscientiousness, Extraversion and Stability) each of which is represented by two 'minor' scales.

Results

Correlations between MTQ48 and Prevue Ability scale and Prevue Inventory of Interests

	Abilities				Motivation to Work With		
	General	**Verbal**	**Numerical**	**Spatial**	**People**	**Data**	**Things**
Overall MT	-0.02	-0.13	-0.03	0.09	0.33**	-0.13	-0.08
Challenge	0.13	-0.02	0.11	0.19*	0.29**	-0.25*	-0.02
Commitment	-0.09	-0.15	-0.10	0.04	0.30**	0.02	-0.15
Control	0.07	-0.03	0.06	0.14	0.14	-0.09	0.09
Control: Life	0.10	0.11	0.06	0.09	0.16	-0.05	-0.06
Control: Emotions	0.03	-0.05	-0.02	0.19*	0.11	0.02	0.07
Confidence	-0.11	-0.21*	-0.09	-0.06	0.37**	-0.10	-0.14
Confidence: in Abilities	-0.09	-0.14	-0.09	-0.02	0.25*	-0.15	-0.05
Confidence: Interpersonal	0.01	-0.12	0.02	0.11	0.23*	-0.05	-0.12

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Summary of correlations

Individuals scoring higher on **Total Mental Toughness** were significantly more likely to score higher in their **motivation to work with people**.

Individuals scoring higher on **Mental Toughness: Challenge** were significantly more likely to score higher in their **spatial abilities**, and their **motivation to work with people** and lower in their motivation to work with **data**.

Individuals scoring higher on **Mental Toughness: Commitment** were significantly more likely to score higher in their **motivation to work with people**.

Individuals scoring higher on **Mental Toughness: Control of Emotions** were significantly more likely to score higher in their **spatial abilities**.

Individuals scoring higher on **Mental Toughness: Confidence** were significantly more likely to score higher in their **motivation to work with people** and lower in their verbal abilities.

Individuals scoring higher on **Mental Toughness: Confidence in Abilities** were significantly more likely to score higher in their **motivation to work with people**.

Individuals scoring higher on **Mental Toughness: Interpersonal Confidence** were significantly more likely to score higher in their **motivation to work with people**.

Correlations between MTQ48 and Prevue Personality Instrument

	Independent	Competitive	Assertive	Conscientious	Conventional	Organised	Extrovert
Overall MT	0.30**	0.11	0.34**	-0.09	-0.16	0.01	0.33**
Challenge	0.38**	0.26**	0.33**	-0.33**	-0.32**	-0.19	0.30**
Commitment	0.20*	0.11	0.22*	0.17	0.04	0.22*	0.22*
Control	0.03	-0.03	0.06	-0.06	-0.15	0.01	0.08
Control: Life	0.11	-0.11	0.21*	-0.05	-0.18*	0.06	0.15
Control: Emotions	-0.06	-0.08	-0.05	-0.09	-0.07	-0.10	0.15
Confidence	0.39**	0.12	0.51**	-0.06	-0.17	0.03	0.41**
Confidence: in Abilities	0.15	0.05	0.19*	-0.03	-0.09	0.03	0.27**
Confidence: Interpersonal	0.46**	0.23*	0.50**	-0.16	-0.20*	-0.08	0.28**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Summary of correlations

Individuals scoring higher on **Total Mental Toughness** were significantly more likely to score higher in **Independence**, **Assertiveness** and **Extrovert**.

Individuals scoring higher on **Mental Toughness: Challenge** were significantly more likely to score higher in **Independence**, **Competitiveness**, **Assertiveness,** and **Extrovert**. They scored lower on **Conscientiousness** and **Conventional.**

Individuals scoring higher on **Mental Toughness: Commitment** were significantly more likely to score higher in **Independence**, **Assertiveness, Organised** and **Extrovert**.

Individuals scoring higher on **Mental Toughness: Control of Life** were significantly more likely to score higher in **Assertiveness**.

Individuals scoring higher on **Mental Toughness: Confidence** were significantly more likely to score higher in **Independence**, **Assertiveness,** and **Extrovert**.

Individuals scoring higher on **Mental Toughness: Confidence in Abilities** were significantly more likely to score higher in **Assertiveness,** and **Extrovert**.

Individuals scoring higher on **Mental Toughness: Interpersonal Confidence** were significantly more likely to score higher in **Independence**, **Competitiveness, Assertiveness,** and **Extrovert**. They scored lower in **Conventional**.

Correlations between MTQ48 subscales and Prevue Orientations

	Group Orientated	Outgoing	Stable	Poised	Relaxed	Social Desirability
MTQ Overall	0.14	0.36**	0.43**	0.44**	0.34**	0.18*
MTQ Challenge	0.14	0.37**	0.22*	0.26**	0.09	0.08
MTQ Commitment	0.10	0.25*	0.16	0.21*	0.11	0.17
MTQ Control	-0.04	0.09	0.49**	0.46**	0.40**	0.02
MTQ Life Con	0.03	0.20*	0.44**	0.39**	0.38**	-0.03
MTQ Emm Con	0.05	0.11	0.33**	0.35**	0.25*	0.08
MTQ Conf	0.21*	0.46**	0.39**	0.35**	0.36**	0.21*
MTQ Conf Ablt	0.19*	0.23*	0.55**	0.51**	0.46**	0.21*
MTQ Conf Int	0.09	0.36**	0.30**	0.32**	0.25*	0.09
**	Correlation is significant at the 0.01 level (2-tailed).					
*	Correlation is significant at the 0.05 level (2-tailed).					

Individuals scoring higher on **Total Mental Toughness** were significantly more likely to score higher in **Outgoing, Stable, Poised, Relaxed and Social Desirability**.

Individuals scoring higher on **Mental Toughness: Challenge** were significantly more likely to score higher in **Outgoing, Stable, Poised**.

Individuals scoring higher on **Mental Toughness: Commitment** were significantly more likely to score higher in **Outgoing**.

Individuals scoring higher on **Mental Toughness: Control** were significantly more likely to score higher in **Stable, Poised, Relaxed**.

Individuals scoring higher on **Mental Toughness: Life Control** were significantly more likely to score higher in **Outgoing, Stable, Poised, Relaxed**.

Individuals scoring higher on **Mental Toughness: Emotional Control** were significantly more likely to score higher in **Stable, Poised, Relaxed**.

Individuals scoring higher on **Mental Toughness: Confidence** were significantly more likely to score higher in **Group Orientated**, **Outgoing, Stable, Poised, Relaxed** and **Social Desirability**.

Individuals scoring higher on **Mental Toughness: Confidence in Abilities** were significantly more likely to score higher in **Group Orientated**, **Outgoing, Stable, Poised, Relaxed** and **Social Desirability**.

Individuals scoring higher on **Mental Toughness: Interpersonal Confidence** were significantly more likely to score higher in **Outgoing, Stable, Poised, Relaxed**.

Mental Toughness and Reaction to Test Environments: Appraisal and Physiological Response

This study aimed to investigate individual's responses to and appraisal of taking a test in a stressful environment. Individual's subjective ratings of the test were measured as well as their heart rate response to the environment. These measures were then related to each individual's MTQ48 score.

Participants: 29 participants (mean age 21, 15 males, 14 female) took part in this study. All were university students, and were participating to gain experience of graduate recruitment processes. As such, they were motivated to perform well on the test.

Task and Measures: Each participant carried out a standardised psychometric test of verbal and numerical abilities under exam type conditions. To ensure participant involvement in the test environment, they were informed that they would receive feedback on their performance later and that the time limits would be strictly adhered to. The test was split into two halves of 30 minutes, the first was for verbal ability, the second for numerical ability. Participants' heart rate was measured throughout the test, measures of state anxiety was taken before and after the test, and measures of subjective experiences (How stressful was it? How much effort did the test require? How much time pressure did you feel?) were taken post-test.

Results

Correlations between mental toughness (MTQ48) subscales and state anxiety pre and post test.

	State Anxiety	
MTQ Subscales	**Before Test**	**After Test**
Challenge	-0.24	0.02
Commitment	-0.26	-0.51*
Control	-0.48*	-0.42*
Control: Emotions	-0.47*	-0.32
Control: Life	-0.34	-0.41*
Confidence	-0.37*	-0.41*
Confidence: In Abilities	-0.37*	-0.42*
Confidence: Interpersonal	-0.25	-0.26

* Correlation is significant at the 0.05 level (2-tailed).

Summary of Anxiety Correlations

Participants scoring higher on MT Commitment reported lower levels of state anxiety post-test.

Participants scoring higher on MT Control reported lower levels of state anxiety pre- and post-test.

Participants scoring higher on MT Emotional Control reported lower levels of state anxiety pre-test.

Participants scoring higher on MT Life Control reported lower levels of state anxiety post-test.

Participants scoring higher on MT Confidence reported lower levels of state anxiety pre- and post-test.

Participants scoring higher on MT Confidence in Abilities reported lower levels of state anxiety pre- and post-test.

Correlations between MTQ subscales and subjective test experience

	Subjective Ratings			Heart Rate		
MTQ Subscales	**Stressful**	**Effort**	**Time Pressure**	**Pre-Test**	**During Verbal Test**	**During Numerical Test**
Challenge	0.16	0.02	0.11	-0.19	-0.18	-0.24
Commitment	-0.32	-0.11	-0.13	0.06	-0.05	-0.06
Control	-0.35	-0.39*	-0.37*	-0.48*	-0.46*	-0.32
Control: Emotions	-0.33	-0.35	-0.26	-0.39	-0.36	-0.21
Control: Life	-0.27	-0.33	-0.40*	-0.43*	-0.45*	-0.36
Confidence	-0.38*	-0.28	-0.24	-0.22	-0.18	-0.08
Confidence: In Abilities	-0.16	0.03	0.04	-0.16	-0.11	-0.12
Confidence: Interpersonal	-0.47*	-0.48*	-0.43*	-0.20	-0.19	-0.02

* Correlation is significant at the 0.05 level (2-tailed).

Summary of Subjective Rating Correlations

Participants scoring higher on MT Control reported lower levels of effort required and lower amounts of time pressure experienced.

Participants scoring higher on MT Life Control reported lower amounts of time pressure experienced.

Participants scoring higher on MT Confidence reported lower levels of stress experienced.

Participants scoring higher on MT Interpersonal Confidence reported lower levels of stress, lower levels of effort required and lower amounts of time pressure experienced.

Summary of Heart Rate Correlations

Participants scoring higher on MT Control exhibited lower heart rate values pre-test, and during the verbal test.

Participants scoring higher on MT Life Control exhibited lower heart rate values pre-test, and during the verbal test.

Mental Toughness and Shift Work: Implications for Job Satisfaction and Psychological Health

Work life has a significant impact on health and psychological well-being. A range of situational, biological and psychological individual differences have been suggested to modify the impact of shift and night work. The aim of this study was to investigate whether mental toughness influences job satisfaction, coping strategies and psychological health in shift workers.

Coping Strategies

Efforts to manage stress through effective coping strategies play a significant role in determining the level of impairment suffered by those encountering stressful situations. Coping strategies can be generally classified as either approaching and confronting the problem or avoidant strategies that

Participants

105 male power station workers took part in this study, all of whom worked on a particular shift pattern. Thirty worked on permanent night shifts (mean age 39.27, SD 8.33), fifty two worked on permanent day shifts (mean age 41.50, SD 12.69) and twenty three worked on rotating shifts (mean age 36.43, SD 7.91).

Measures

Participants confidentially completed several questionnaires to assess levels of Mental Toughness, Job Satisfaction, Coping Strategies and Psychological Health.

Mental Toughness was measured using the MTQ48 and the overall scores was used as a measure of mental toughness.

Coping strategies were assessed using the Coping Strategies Inventory developed by Tobin, Holroyd, Reynolds, and Wigal (1984) which measures two forms of coping: *Engagement* and *Disengagement*, each with 16 items. *Engagement* coping indicates the extent to which a person uses approach or active strategies to cope with stressful events. *Disengagement* coping indicates the extent to which a person uses avoidant or passive strategies to cope with stressful events.

Psychological Health was measured using well used scale: the 12 item General Health Questionnaire (GHQ) developed by Goldberg (1972). A high score indicates poorer psychological health.

Job Satisfaction was measured using a five-tem scale used in Hackman and Oldham's (1975) Job Satisfaction Survey, with higher scores indicating greater job satisfaction.

Summary of Results

Night workers who scored higher in mental toughness displayed better levels of psychological health.
Night workers using disengaging coping strategies scored lower on job satisfaction.

None night workers who scored higher on mental toughness reported significantly better psychological health.
None night workers who scored higher on mental toughness reported significantly better job satisfaction.

Night workers in low in mental toughness reported using more disengagement strategies to cope with stressful events, although not significant. None night workers low in mental toughness reported using significantly more disengagement strategies to cope with stress than those scoring high in mental toughness.

Conclusions

The findings of this study imply that individuals may experience beneficial or protective effects from being mentally tough against the stress of shift work and job dissatisfaction. Furthermore, there is evidence that mental toughness acts as a mediating factor in dealing with some of the strains of shift work.

SHORT CASE STUDY: Mental Toughness and Tolerance of Physical Discomfort

This Study aimed to assess the influence which Mental Toughness, as measured using the MTQ48, has upon an individual's ability to tolerate physical discomfort. The MTQ48 model predicts that individual's ability to endure physical discomfort will significantly and positively correlate with Mental Toughness and its sub-components.

Participants: Forty one males with a mean age of 21 years (SD = 2.7) and mean weight of 79.6kg (SD=5.0) took part in this study. All were assessed for their suitability for undertaking the physical endurance task.

Task: The task constituted a standardised method of assessing physical endurance. Participants were instructed to lift a dumb-bell using their dominant arm in an over-hand grip from its resting position on a desk to a holding position, and maintain this position for as long as possible. The dumb-bell was standardised to weigh approximately 1.5% of the participant's own body weight. This low resistance was chosen to produce gradual increase in physical sensations during the task. The holding position required participants to hold the weight suspended with a straight arm directly in front of their body and over a desk, with a 90º angle between arm and torso. Performance was timed until participants were unable to maintain the holding position.

Results: Mean total Mental Toughness scores were 3.60 (SD = 0.3), and mean time to stopping the physical endurance task was 213.6s (SD=43.4). Pearson's correlation indicated that these values were significantly ($p<0.05$) and positively correlated for **Total Mental Toughness** (r=0.34), **Control** (r=0.37), **Confidence** (r=0.29), but not for **Challenge** (r=0.22) or **Commitment** (r=0.23).

Results Summary: Individuals who scored higher on total Mental Toughness, Control and Confidence were significantly more likely to tolerate the physical endurance task for longer than those individuals who scored lower on these factors.

Conclusions: As physical endurance was positively and significantly correlated to Total Mental Toughness, as well as Control and Confidence, these results support the criterion validity of the MTQ48 and its model of Mental Toughness. Specifically, the Control and Confidence components of Mental Toughness seem particularly important when considering performance under physically stressful environments. As such, individuals scoring higher in these components are more likely to perform better under strain.

SHORT CASE STUDY: Rugby Players' Mental Toughness: Comparing Ability Level and Coach Assessment

To ascertain whether individual's ratings of their mental toughness is in line with significant other's ratings of their mental toughness this study investigated the mental toughness ratings of rugby players and their ratings of the players mental toughness.

Participants

35 rugby players (20 female, 15 male, mean age 21) completed the MTQ48 and their coaches completed ratings of each players mental toughness. In addition, players completed measures of optimism, self-image, life satisfaction, and self-efficacy.

Results

Scale and Mental Toughness Rating Correlations with players total MTQ48 scores

Optimism	r=0.48	p<0.01
Self-Image	r=0.42	p<0.05
Life Satisfaction	r=0.56	p<0.001
Self-Efficacy	r=0.68	p<0.001
Coaches Ratings	r=0.42	p<0.05

Summary

Total mental toughness positively correlated with ratings of optimism, self-image, life satisfaction, and self-efficacy. Coaches ratings of each player's mental toughness significantly correlated with players own ratings of their mental toughness.

MTQ48 scores and Coaches ratings of Mental Toughness relating to level of competition

	University Level Players		Regional Repetitive Players		Significant Difference
	Mean Score	SD	Mean Score	SD	
MTQ 48	166	20	183	29	**Yes** (p<0.05)
Coaches Ratings of Mental Toughness	52	7	56	9	**No** (p=0.16)

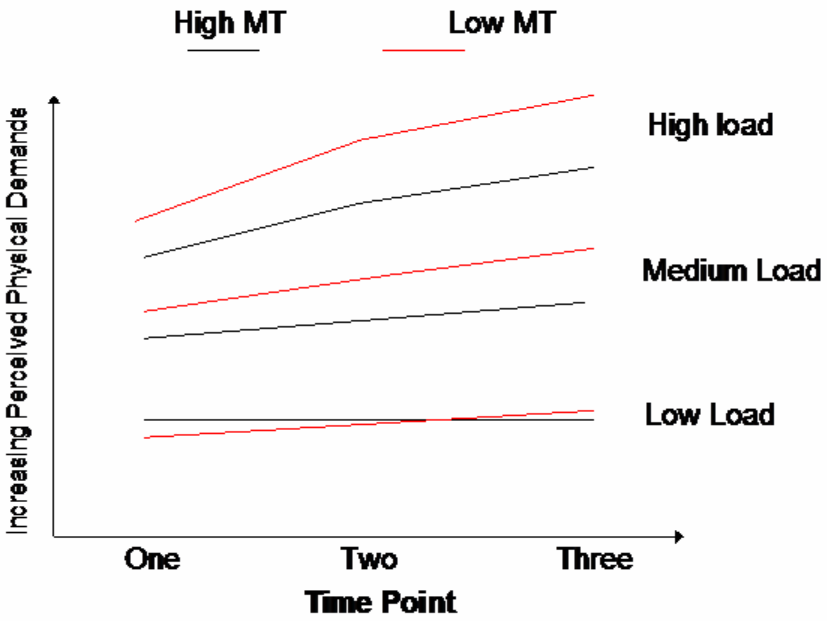
The MTQ48 significantly distinguishes between level of competitors, with players of regional standard rating significantly higher on mental toughness than university level players. Coaches ratings did not significantly discriminate between players of different competition level.

SHORT CASE STUDY: Mental Toughness and Perceptions of Physical Effort

This study investigated the mediating effects of mental toughness on ratings of perceived physical demands during a physical endurance task. It was predicted that those individuals scoring higher in mental toughness would perceive physical demands as less than those individuals scoring lower on mental toughness.

23 participants (15 male, 8 female, mean age 24) took part in a cycling task on three separate occasions. Participants cycled for 1 hour on each of the three occasions, and each separate occasion represented a different level of physical exertion. To control level of exertion in line with fitness levels, each participant was tested using a standardised fitness testing protocol (VO2 Max). In line with their observed fitness level, participants would then cycle at the following exertion levels on the three occasions: High exertion level (70% of VO2 MAX Score), Medium exertion level (50% of VO2 MAX Score), Low exertion level(30% of VO2 MAX Score) workloads (cycling)

Results



Findings: At high and medium levels of exertion, participants with higher mental toughness scores reported lower levels of perceived physical demands than those participants with low mental toughness scores. As such, mentally tough individuals seem to cope better with physical discomfort than those who score lower in mental toughness.

Mental Toughness and Rehabilitation from Sport Injury

Athletes ability to cope with physical injuries and successfully adhere to rehabilitative regimes is of great interest to those looking to improve rehabilitation success and ensure continued participation. The present study followed 70 athletes throughout a rehabilitative regime for sports injuries.

All participants completed The MTQ48 at the start of the rehabilitation program, and the following important measures were used to assess participation in and experiences of rehabilitation and injury: *Susceptibility* (perceived susceptibility to future injury), *Treatment efficacy* (belief in the treatment regime), *Rehabilitation Value* (belief in the importance of the outcome of rehabilitation), *Severity* (perceived severity of the injury), *Pain- direct coping* (ability to cope with pain directly), *Pain- catastrophizing* (catastrophising about the pain being experienced), *Pain- somatic awareness* (physical awareness of pain), *Clinic adherence* (adherence to exercises and procedures within the clinical setting), *Home adherence* (adherence to home based exercises and procedures), *Attendance* (actual attendance to rehabilitation sessions).

Results

Correlations between mental toughness and rehabilitation measures

Construct	Mental Toughness	*M*	*SD*
Mental toughness	(.65)	50.44	13.32
Susceptibility	.-31*	23.01	3.83
Treatment efficacy	.20	71.21	2.46
Rehabilitation value	.22	5.10	1.10
Severity	-.30	20.10	2.62
Pain- direct coping	.43*	17.53	3.55
Pain- catastrophizing	-.32*	15.46	1.79
Pain- somatic awareness	.07	10.30	2.16
Clinic adherence	-.30*	273.10	74.96
Home adherence	-.28*	89.46	33.95
Attendance	.25*	91.77	9.04

* Statistically significant correlations

These findings show that higher mentally tough individuals believed that they were less susceptible to further injury than their less mentally tough counterparts. This finding was emulated with regard to pain in that more mentally tough individuals were better able to cope with pain during rehabilitation by using more direct coping methods. In contrast low mentally tough individuals were found to dwell upon the pain during rehabilitation and potentially despair when the pain is unbearable. With regard to rehabilitation adherence, greater attendance at rehabilitation sessions was displayed by those who had higher levels of mental toughness. Higher mentally tough individuals also demonstrated higher levels of adherence to procedures whilst within the clinical environment. Importantly, high mental toughness was associated with greater adherence to home based exercises and procedures.

Conclusions and Implications

The finding that low mentally tough individuals were less able to cope with their injuries and were also less likely to successfully participate in rehabilitation has important implications for both sporting and occupational settings. Of particular importance is the lower perceptions of future injury risk. This represents a continues confidence in ability to perform or compete, which the injury has not reduced. For athletes and sport rehabilitators, the knowledge that high levels of mental toughness are associated with successful participation in rehabilitation regimes is important for promoting future program success. By identifying low mentally tough individuals, appropriate efforts can be made to support them to ensure successful rehabilitation outcomes. This finding also adds weight to the proposition that highly mentally tough individuals are better able to deal with stresses and setbacks than low mentally tough individuals.

In occupational settings, it would be important to note that low mentally tough individuals could potentially be vulnerable to poor health outcomes as a result of illnesses. This represents a double detriment for such individuals: firstly, low mentally tough individuals are more likely to report worse health outcomes (see case studies). Secondly, these individuals seem less likely to be able to deal with illnesses and successfully adhere to advice. High mentally tough individuals on the other hand seem less likely to report poorer health (see case studies) and are more likely to successfully adhere to any advice given to return from such injuries.

Mental Toughness and Police Stop and Search Behaviour

Police performance and behaviour is of continued critical interest. Of particular interest is police officers willingness to participate in stop and search activities, regardless of the risks involved in such actions. This study assessed police officers stop and search behaviour whilst on the beat. Stop and search responsibilities and actions are a key performance criterion for the beat police officer. Such actions are difficult to perform and are often carried out in difficult and dangerous settings. As such, there have been concerns that some officers may be avoiding this activity to reduce their stress levels.

The study followed 110 police officers on their beat activities. All completed the MTQ48 prior to a period of beat shifts. During shifts, officers automatically report stop and search activities, but they were also asked to record their desire to participate in such activities. Anxiety levels were also recorded for consideration.

Results

Relationship between the MTQ48 and the desire and usage of stop and search

	Overall Desire	Overall Use	Overall Anxiety
Total Mental Toughness	0.19*	0.24*	-0.59*
Challenge	0.15	0.21*	-0.53*
Commitment	0.18	0.18	-0.40*
Control	0.15	0.19*	-0.51*
Confidence	0.18	0.26*	-0.60*
Emotional Control	0.16	0.14	-0.29*
Life Control	0.10	0.19	-0.59*
Confidence (abilities)	0.11	0.15	-0.61*
Confidence (interpersonal)	0.22*	0.33*	-0.42*
Overall Desire		0.81*	-.0.15
Overall Use	0.811*		
Overall Anxiety	-0.11	-0.15	

* Significant correlations

Firstly, it is important to note that actual use of stop and search activities was associated with an increased desire to carry them out. In relation to Mental Toughness: Higher levels of overall mental toughness was associated with increased desire to carry out and actual use of stop and search activities, as well as reduced levels of anxiety. Additionally, desire to stop and search was associated with high levels of interpersonal confidence. Overall use of stop and search activities was associated with higher levels of challenge, overall control, overall confidence, and interpersonal confidence. All Mental Toughness components were associated with lower levels of reported anxiety.

Conclusions and Implications

Increased mental toughness is associated with increased desire to use and actual use of stop and search activities. Total mental toughness and interpersonal confidence is associated with increased desire to stop and search, whereas Total mental toughness, challenge, control, confidence and interpersonal confidence is associated with increased use of stop and search. As such, mental toughness seems to be a key factor in the beat officers ability and willingness to perform their activities. A finding further emphasised by higher mental toughness is associated with lower anxiety.

The results reported here demonstrate that although mental toughness is strongly associated with anxiety, anxiety does not seem to influence stop and search desire or use. This suggests that it is not anxiety, but the individual's personal characteristics that influence their behaviour in these settings.

There are implications outside of the police force. It seems that highly mentally tough individuals seem better able to work in stressful settings and carry out seemingly stressful and tough jobs compared to their lower mentally tough counterparts.

These findings add further weight to the argument that increased mental toughness is associated with improved ability to deal with stressors and perform under pressure. This further demonstrates that the MTQ48 is a specific and occupationally relevant measure of personal characteristics.

SHORT CASE STUDY: Mental Toughness and Health 2

An individual's mental health can give valuable insight into the protective influence of mental toughness against stress and adversity. The present study assessed individuals' mental health using a number of common measures of mental health. Participants were employed in prison and higher educational institutes.

The General Health Questionnaire (GHQ) is a standardised screening instrument to assess the probability of minor psychiatric disorders, and is a common measure used to give insight into an individuals present state of mind. The Minor Health Complaints questionnaire (MHCQ) is a 13 item scale examining minor physical health complaints.

Correlations between the MTQ48 and the GHQ/MHCQ

	GHQ	MHCQ
Overall MT	-0.70	-0.53
Commitment	-0.52	-0.50
Control	-0.54	-0.60
Challenge	-0.71	-0.37
Confidence	-0.57	-0.36

Correlations indicate that higher levels of mental toughness as measured using the MTQ48 was associated with better mental (GHQ) and physical health (MHCQ).

Conclusions and Implications

These findings have obvious implications for employers as well as individuals. Specifically, those individuals with lower levels of mental toughness who are employed in demanding or stressful work may be vulnerable to mental and physical health complaints. Whereas individuals higher in mental toughness have demonstrated that they are more able to effectively deal with such stresses. Individuals low in mental toughness should be made aware of more effective methods of coping with stress and adversity.

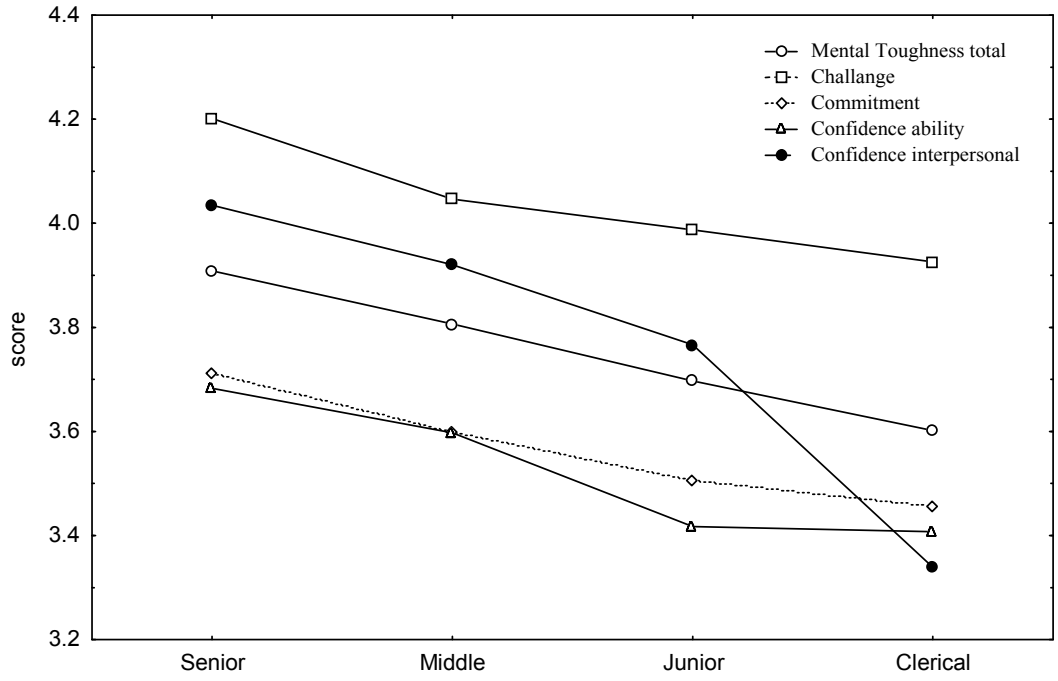
Mental toughness and managerial position.

Exposure to specific occupational environments could effectively develop mental toughness in individuals, and as such specific patterns of mental toughness may be observed in different occupations ands different positions of responsibility. This study sought to investigate the effects of different managerial position and age on levels of mental toughness as reported by the MTQ48.

Participants: The present study consisted of 504 (248 Male, 366 Female) participants aged between 20 and 65 years who were working in UK based organisations. One hundred and fifty seven of the participants worked as senior mangers, 189 as middle managers, 112 as junior managers and 47 in a clerical role. The sample consisted of 472 Caucasian, 17 black, 8 Asian and 8 unspecified participants. All participants completed the MTQ48 as part of employee assessment and development centres organised by their employers and ran by AQR.

Results: ***Mental Toughness and Management Position***

Significant effects were observed for the reported levels of mental toughness of individuals at increasing levels of managerial responsibility.



Specifically the management group main effect showed that for Interpersonal Confidence all groups were different from each other (see graph) demonstrating a gradual increase with higher positions. In addition, for the total mental toughness score and the confidence in ability scores all groups were different from each other except the junior and clerical staff. Finally, for the challenge and commitment scores the senior managers were higher than all other groups and the middle managers were significantly higher than clerical staff for the commitment variable.

Conclusions and Implications

These findings show that the MTQ48 is sensitive in measuring differences in mental toughness between individuals at increasing levels of managerial responsibility. Individuals who are higher in mental toughness are more likely to be found at higher levels of managerial responsibility, particularly in relation to challenge, commitment and confidence. Although these findings do not make clear if this is a selective or developmental relationship, what is clear is that individuals with lower levels of mental toughness and who are less able to develop their mental toughness are less likely to be found in higher levels of managerial responsibility.

Mental Toughness and Delinquency

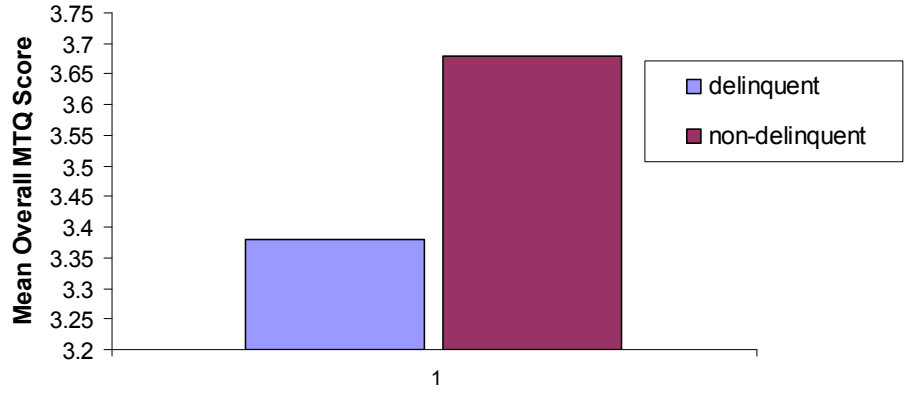
This project investigated the relationship between Mental Toughness, Self-Esteem and Self-Efficacy in relation to delinquency, particularly risk and protective factors.

Participants: Twenty-two participants made up the control group, with a mean age of 29.91 (range = 18 - 49, SD = 12.13). The Delinquency group consisted of 19 participants with a mean age of 30.42 (range = 15-57, SD = 9.32). The delinquency sample was recruited a Drug Intervention Programme (DIP) and Youth Offending Team (YOT).

Materials: *Mental Toughness Questionnaire*: The MTQ48. *Self-Esteem and Self-Efficacy*: 12 item questionnaire (6 for each). *Adversity*: level of adversity experienced was measured using a Life Events Scale adapted from the Multidimensional Assessment of Stressful Life Events scale developed by Newcomb, Huba and Bentler (1981).

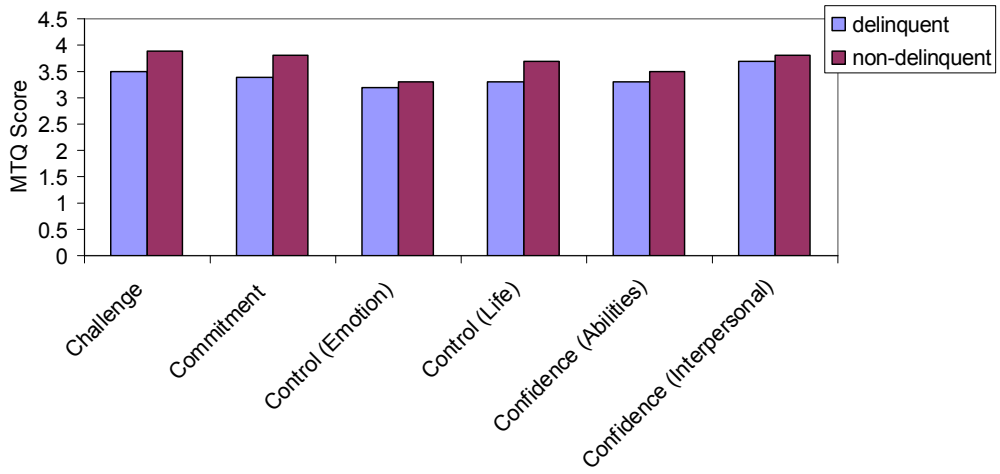
Results: A significant difference was observed between the total Mental Toughness scores of delinquents (mean = 3.38, SD = 0.41) and non-delinquents (mean = 3.68, SD = 0.33) ($F(1,39)=6.60$, $p<0.001$), as shown in Figure 1.

Figure 1. Total Mental Toughness Scores



Significant differences were observed between delinquents and non- delinquents on Mental Toughness Subscales: Challenge ($F(1,39)=16.29$, $p<0.001$), Commitment ($F(1,39)=6.93$, $p<0.001$), and Control (Life) ($F(1,39)=6.11$, $p<0.001$). In each case delinquents scored significantly lower than non-delinquents (see table ???). No differences were observed between levels of Control (Emotion), Confidence (Abilities) and Confidence (Interpersonal).

Figure 2. Mental Toughness Subscales



	Delinquent		Non-Delinquent	
	Mean	**SD**	**Mean**	**SD**
Challenge	3.5	0.47	3.9	0.31
Commitment	3.4	0.56	3.8	0.28
Control (Emotion)	3.2	0.37	3.3	0.54
Control (Life)	3.3	0.49	3.7	0.48
Confidence (Abilities)	3.3	0.55	3.5	0.57
Confidence (Interpersonal)	3.7	0.47	3.8	0.5

Additional Results: Delinquents scored significantly lower on the measure of self-efficacy (mean = 3.53, SD = 0.57) ($F(1,39) = 4.90$, $p<0.001$) compared to non-delinquent participants (mean = 3.88, SD = 0.46). Delinquents also scores significantly lower on the measure of self-esteem (mean = 3.49, SD = 0.62) ($F(1,39)=10.92$, $p<0.001$) compared to non-delinquent participants (mean = 4.11, SD = 0.59). Delinquents also scored significantly higher in levels of adversity (mean = 4.58, SD = 1.45) ($F(1,39)=9.25$, $p<0.001$) compared to non-delinquents (mean = 3.18, SD = 1.56).

Discussion: Individuals classed as delinquents due to specific types of behaviour scored significantly lower on Total Mental Toughness and the MTQ subscales Challenge, Commitment and Control (Life) when compared to non-delinquents. Such findings suggest that these lower levels of Mental Toughness have some relationship with either the development of or experience of delinquent behaviour.

SHORT CASE STUDY: Mental Toughness study on an Outbound Call Centre based in the North West of England

Call centres are increasingly used in a variety of settings, and have been show to be demanding work settings. An employees ability to cope with such demands and their ability to perform is of critical importance in such a time constrained environment. Furthermore, such environments experience high levels of employee attrition due to individuals inability to deal with the associated stressors and perform. As such, call centres have to allocate significant resource to continuing training and selection of new employees. This study assessed the relationship between mental toughness and effectiveness and efficiency of call centre staff.

A sample of 127 inbound and outbound agents from an outsourcing call centre completed the MTQ48. Call availability (sign in duration) was measured as an indicator of Efficiency and Effectiveness was indicated through measurement of call conversion rates.

Correlations between mental toughness, effectiveness and efficiency

	MTQ48	Effectiveness	Efficiency
MTQ48	1.0	0.57*	0.39*
Effectiveness	0.57*	1.0	0.45*
Efficiency	0.39*	0.45*	1.0

* Statistically significant correlations

Mentally toughness was shown to be significantly related to improved effectiveness and efficiency within the call centre. Effectiveness was also shown to be significantly related to efficiency.

Conclusions and Implications

Higher levels of Mental Toughness was associated with individuals performing better in this particular organisation. Specifically, individuals who were higher in mental toughness were also more likely to score highly on measures of effectiveness and efficiency within the call centre. Direct implications of these findings are that individuals who are higher in mental toughness are more able to deal with the stresses associated with call centre work and as such are also able to perform within such environments.